RESEARCH ARTICLE

Factors Predicting the Adoption of E-Government Services in Telecenters in Rural Areas: The Mediating Role of Trust

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Abstract: This study aims to inspect the factors that impact the adoption of e-government services (e-Gov) in telecenters in Malaysia and the mediating role of trust in this regard. A survey was conducted with the use of a questionnaire. The collected sample involved people who lived in rural areas and telecenters (N= 388). The results demonstrate that performance expectancy, social influence, and facilitating conditions are all directly and positively correlated with telecenter users' intention to use e-Gov, which is directly related to the official usage of e-Gov in telecenters. The results showed that trust partially mediated between users' intention and the actual usage of these services. This study has revealed that telecenters in Malaysia have opened up a unique window of opportunity for people who live in rural areas. This would help the Malaysian government and policymakers investigate the reasons for the current low penetration rate of e-Gov, and formulate methods to inspire the official use of e-Gov by those living in rural areas, where such facilities are still seen as an innovation.

Keywords: UTAUT, e-government, telecenters, trust, rural areas

Information and communication technologies (ICTs) for rural development have been an emerging topic of research in most developing countries (Barrett et al., 2017). The development of rural areas is a foundation for social growth and financial development, with ICT being an important component (Salemink et al., 2017). Rural people should have access to information technology that will allow them to become more competent and effective in performing their social and economic roles in society. With this in mind, the governments of developing nations have sought to introduce ICT initiatives in rural settings under the direct and indirect oversight of national and global organizations, for example, the United Nations and the World Bank (Alam, 2017). According to Heeks (2017), ICT-enhanced e-Gov can, in particular, support the process of rural growth in developing countries. It provides the services of central government departments, central agencies, and district authorities to those who live in remote rural areas (Janowski, 2015; Rana et al., 2015). Furthermore, e-Gov can play a crucial role in increasing the overall quality of living, generating income, and delivering quality and cost-efficient public facilities to rural communities

(Anthopoulos et al., 2016).

The e-Gov services connect users with various government departments, including the Royal Malaysia Police and the Road Transport Department. Despite attempts by governments to focus on the use of ICT in rural regions, a disparity still exists among the rural and urban residents in terms of ICT penetration in developing nations such as Malaysia (Adjei-Bamfo et al., 2019). To resolve this problem, the Malaysian government, local NGOs, and private entities have set up and sponsored community telecenters that provide access to the use of ICT, particularly for those in rural areas (Jackson & Wong, 2017). A telecenter is a community center where villagers can use PCs, the Internet, and various modern technologies to obtain knowledge, develop, and connect with other people while learning vital digital competencies (Furuholt & Sæbø, 2018). Local community telecenters in Malaysia's rural regions can reduce the digital gap between underprivileged communities and rural areas (Latchem, 2018).

Since 2001, more than two thousand telecenters have been launched by government agencies, NGOs, and private entities in Malaysia (Solarin et al., 2019). Telecenters in the country are now considered to be among the most effective platforms to enhance community involvement in e-commerce. The e-Gov platform and online activities encourage the use of ICT amongst rural communities (Brimkulov & Baryktabasov, 2018). Integrated e-Gov telecenters would thus be a suitable model for the government to extend the variety of services it offers and deliver quality services that are lacking in rural areas. This will pave the way for the government to further enhance the efficiency of its rural citizens and to provide telecenters with income stability. Saeed et al. (2018) suggested that telecenters can serve as multipurpose local ICT community centers that provide e-Gov, e-commerce services, as well as other ICT-related amenities.

According to Brimkulov and Baryktabasov (2018), most governments are intrigued by the prospect of telecenters owned by non-state actors that can provide an integrated variety of services. However, given the rapid roll-out of telecenters across the country, the adoption of e-Gov by telecenter users in Malaysia remains largely unexplored in previous studies. Thus, the relative novelty of the concept of e-Gov embedded rural telecenters in Malaysia and the absence of studies examining Malaysia's perception of e-Gov through rural telecenters provided the motivation and rationale for undertaking this study. This study attempts to inspect the prominent factors leading to the adoption of e-Gov by telecenters in Malaysia.

To date, numerous models of technology acceptance have been designed to explain the factors affecting e-Gov adoption (Ghareeb et al., 2019; Jung, 2019). The unified theory of acceptance and use of technology (UTAUT; Venkatesh et al., 2003) is the most well-known model used to clarify the acceptance of information systems (ISs) by individuals. Kurfalı et al. (2017) argued that UTAUT offers a more comprehensive picture of technology adoption than any other model, particularly in the developing world. This research applies UTAUT, given that no earlier research has been carried out to use UTAUT for the adoption of e-Gov by telecenter users, specifically in developing countries such as Malaysia. Ramli (2017) demonstrated how the services provided by e-Gov through telecenters could affect trust among people and intermediaries at different levels. The adoption of e-Gov leads to citizens' overall satisfaction and increases trust among the government and the general public (Janssen et al., 2018). As stated by Venkatesh et al. (2016), trust is a key means of increasing citizen's confidence in e-Gov platforms. Thus, trust in e-Gov, in turn, influence their intentions to use e-Gov facilities. Gupta et al. (2017) have shown that accessibility is also the primary driver in explaining the use of ICT by users through e-Gov platforms.

Currently, efforts to integrate trust and accessibility into UTAUT are limited to proposals concerning conceptual frameworks or validation of certain elements of their correlations (Hew et al., 2016). Conversely, over the past 20 years, many researchers have investigated the effect of trust and accessibility on the key factors of the technology acceptance model (TAM; Alalwan et al., 2018). Hence, it is necessary to manage an empirical study to explore the association between trust, accessibility, and the key factors of UTAUT. With the adoption of e-Gov among telecenter users in rural Malaysia as an application domain in this work, we have concentrated on empirically recognizing the detailed influences of accessibility on the central factors of UTAUT, thus validating the extended UTAUT in a new setting, and the importance of trust as a mediator for these factors.

The remainder of this paper is structured as follows: Section 2 addresses a brief evaluation of the literature on e-Gov concepts, gaps, and constructs employed in the research. Section 3 details the research methodology, whereas Section 4 presents the data analysis procedure carried out and the results obtained. Section 5 involves an in-depth discussion of the results and concludes the study. Finally, Section 6 highlights some prominent implications and limitations.

Literature Review

e-Government

Governance reforms are currently being pursued through the implementation of e-Gov initiatives, with the primary purpose of improving the overall productivity of state services (Rana et al., 2015). The underlying premise is the linearity between governance and growth, with the need for "good governance" (Alenezi et al., 2015). E-Gov is an initiative that aims to recreate how the state works and enhances the overall quality of interactions with people and businesses through enhanced communication, improved access, strong-quality services, and improved processes and systems (Kurfalı et al., 2017). It is a way for governments worldwide to provide easier access to government resources and incentives for cooperation through the Internet and wireless technological developments (López-López et al., 2018). In addition, telecenters have a key task in the governance and growth of the region by providing connectivity to the Internet and several services, such as e-Gov for rural residents. Telecenters have become hubs for the provision of rural growth support services for their urban catchment areas, and most of them will move towards the adoption of e-Gov services (Sharma & Mishra, 2017) .

In 2000, Malaysia launched many sorts of e-Gov facilities under the name of MyEG: government to business (G2B), government to employee (G2E), government to government (G2G), and government to citizens (G2C; Kamarudin et al., 2018). G2C is wider in scope and covers all Malaysians. Thus, the current study concentrates on G2C. G2C responds to individuals' routine concerns and government transactions (Anwer et al., 2016; Ayoung et al., 2016).

Gap of Previous Studies

Unlike previous studies focusing on Malaysia that investigated the implication and impact of e-Gov (e.g., Ramli, 2017), e-Gov adoption (e.g., Sivaji et al., 2019), telecenters' roles in nation-building (e.g., Tahir et al., 2016), and the digital divide (e.g., Tabassum et al., 2019), this research focuses on e-Gov adoption in rural Malaysia's telecenters. However, some studies like Cheuk et al. (2012) investigated telecenters in Malaysia. Aji et al. (2016) and Bannister and Connolly (2015) also found that telecenters as a kind of government service can enhance information dissemination. Research on e-Gov through telecenters is lacking in the context of Malaysia.

A model such as the UTAUT has been tested solely to determine citizens' intentions to use e-Gov (Ahmad et al., 2016; Rodrigues et al., 2016). Some studies combined trust, along with TAM or UTAUT, and tested the direct influence of trust on behavioral intention (Lallmahomed et al., 2017). Both TAM and UTAUT were criticized for not including constructs that are connected to trust and security (Alharbi et al., 2017).

The literature lacks studies that comprehensively address the concern of telecenter users regarding adopting e-Gov in telecenters and the practical issues that are connected to privacy and the security of the users. Even though trust has emerged as a notable factor in the adoption of new technology, it has received less attention, and some studies recommended further investigation of this particular factor (e.g., Al-Hujran et al., 2015). The majority of studies have incorporated trust as a direct trust that influences e-Gov adoption (e.g., Aladwani, 2018). The literature has shown that inadequate studies have used trust as a mediator (e.g., Venkatesh et al., 2016). In the present study, trust is proposed to play a mediating role between the two dependent constructs (i.e., behavioral intention and actual usage). Ultimately, the common managerial concern is to determine how telecenter users perceive e-Gov in Malaysia›s telecenters and how to improve the adoption of e-Gov among telecenter users. To do so, it is important to consider factors that can promote or discourage behavioral intent and actual behavior. This study focuses on the following research questions:

1. What factors define the behavioral intentions to adopt e-Gov in rural telecenters in Malaysia?
2. Does trust mediate the effect of behavioral intention to adopt e-Gov in telecenters on actual use of the services provided at telecenters?

Theoretical Foundation

A broad range of theoretical models were employed to explain the predictors of e-Gov usage in the related literature, including TAM, UTAUT, the theory of reasoned action (TRA), innovation diffusion theory (IDT), task technology fit model (TTF), the theory of planned behavior (TPB), the model of personnel computer utilization (MPCU), the expectation confirmation model (ECM), and technology-organization-environment model (TOE) (Nugroho, 2015). For example, the IDT has been widely applied in studying users' acceptance and usage of new technologies (e.g., He et al., 2016). As customers present different levels of willingness when adopting an innovation, Rogers (1995) classified customers into five categories regarding individual innovativeness. The model describes exactly how a commodity gains momentum over time and spreads through a social system (Bhattacherjee et al., 2018). Thus, IDT is not useful in this scenario, as it only captures the initial adoption of novel technological innovations by new users, rather than the continued use of existing technology by existing users. The ECM model also focuses on explaining user satisfaction and the intention to continue the use of ISs only through perceived usefulness and confirmation factors (Bhattacherjee et al., 2018).

Additionally, the TAM is among the most widely used models for the acceptance and use of technology (Wu & Chen, 2017). According to TAM, users' perceived ease of use affects the perceived usefulness of ISs; users' perceived ease of use and the perceived usefulness together determine their attitudes toward using ISs. Perceived usefulness and users' attitude determines users' intention. Moreover, users' intention determines their actual usage of ISs (Dwivedi et al., 2017). The TAM and ECM do not include external factors, thus revealing weaknesses in understanding consumer behaviors and behavioral expectations towards the adoption of new technology (Sohn, 2017).

Upon studying and comparing some well-known models, the UTAUT model was employed to build a research model in this work. This model describes four constructs: performance expectancy (PE), effort expectancy (EE), social influence (SI), and facilitating conditions (FC) that are associated with predicting behavioral intention to use technology and the actual use of technology. Venkatesh et al. (2016) found that the earlier established models clarified between 17% and 53% of the theory of variance in behavioral intention. Nevertheless, UTAUT surpassed all models by similar data, indicating about 70% variance in behavioral intent and 50% variance in information technology usage (Venkatesh et al., 2016). Hence, this makes UTAUT a broad, reliable, preferable, and effective model for the adoption of ISs.

Hypothesis Development

Venkatesh et al. (2016) described PE as the degree individuals feel that using the system will assist them in obtaining work performance gains. It is the degree that individual users feel that the use of telecenters can help them enhance their overall efficiency. It is also an important predictor of the intention to use ISs (e.g., Macedo, 2017). This factor has been reported to be the most potent predictor of behavioral intent among the four factors in the UTAUT model. Empirical work was carried out by Lallmahomed et al. (2017) to determine the factors of telecenter user acceptance, and the findings showed that PE is one of the most significant variables of its acceptance. This study also discovered that PE has a significant effect on citizens' attitudes and opinions about the adoption of e-Gov (Rehman et al., 2016). In mobile apps for government services (mG-App), Sharma et al. (2018) have noticed that PE was a significant factor in understanding users' intention to use mG-App. The following hypothesis is, therefore, being tested:

H$_1$. Performance expectancy (PE) has a direct and positive relationship with the intention of using e-Gov in telecenter.

Venkatesh et al. (2003) described EE as the extent of ease, especially in combination with the use of the system. It is related to the degree of simplicity related to the use of e-Gov in telecenters. If telecenter users find e-Gov in telecenters easy to use and does not need much effort, they are more likely to adopt them. In most studies carried out using the UTAUT model, EE was found to have a positive relationship with the intention to use ISs (e.g., Bhatiasevi, 2016). Many researchers, such as Yaseen and El Qirem (2018), have found that EE has a major impact on behavioral intention. In the current

study, this factor is determined by the perceptions of ease, due to the use of e-Gov, along with ease of learning how to employ e-Gov through telecenters. As shown by UTAUT, EE has a strong impact on BI in the use of technology (Venkatesh et al., 2016). Thus, the subsequent hypothesis is tested:

***H*$_2$**. Effort expectancy (EE) has a direct and positive relationship with the intention of using e-Gov in telecenter.

Venkatesh et al. (2016) described SI as the belief by individuals that other experiences should be used in a new system. The reason for this is based on the assumption that telecenter users are strongly influenced by the ambiguity that arises from a new service in the center, such as e-Gov, and this will force users to interact with others (i.e., friends, family members, local community members) to consult on their decisions of adoption. This study assumes that users will be strongly influenced by others when SI is viewed as an important component of a collective society such as Malaysia (Tabassum et al., 2019).

Initially, all of the TRA, TAM2, TPB/DTPB, and C-TAM-TPB models describe SI as a subjective norm, whereas the IDT and the MPCU define SI as an image and a social factor, respectively. Previous studies mentioned that SI is a significant variable in adopting e-Gov in diverse settings (Kurfalı et al., 2017; Mayasari et al., 2017). Hung et al. (2013) also used subjective norms to anticipate mobile government adoption amongst Internet users in Taiwan and recognized a meaningful association between subjective norms and intention. This study, therefore, also proposes the subsequent hypothesis:

***H*$_3$**. Social influence (SI) has a direct and positive relationship with the intention of using e-Gov in telecenter.

Venkatesh et al. (2016) described FC as the manner in which a person assumes that there is an organizational and technological infrastructure to maintain system utilization. They are described as the degree to which the user assumes that there is an organizational and technological infrastructure to enable the use of e-Gov in telecenters. Several studies indicate that FC is the main variable that influences e-Gov adoption by individuals in different countries (Kurfalı et al., 2017; Lallmahomed et al., 2017; Rodrigues et al., 2016). Additionally, Al Mansoori et al. (2018) indicated that the availability of high support and good facilities should have a positive effect on the behavioral intention to use mobile apps for government services. This research, therefore, supports the subsequent hypothesis:

***H*$_4$**. Facilitating conditions (FC) have a direct and positive relationship with the intention of using e-Gov in telecenter.

Accessibility (ACC) is a necessary condition to ensure the quality of the system. It is a system property to the degree that the program itself is either accessible to a user or not, regardless of the user's mission (Vial, 2019). Van Oerle et al. (2016) suggested that it has become easier for individuals to engage in cybernetic communities, given that Internet access has expanded over time. Telecenters have played a significant role in easing increased access to the Internet, especially in developing countries. With face-to-face social interaction, telecenters can improve engagement in virtual communities by creating a conducive environment for participation and design. This would provide an environment where participants can evaluate and observe each other's behavior as they do in daily social interaction (Markus & Rowe, 2018). Latchem (2018) argued that telecenters operate as multi-purpose ICT access community centers offering e-government, e-commerce, and other ICT services. Telecenters will bridge the digital divide by providing ACC and a range of services. This study thus suggests the subsequent hypothesis:

***H*$_5$**. Accessibility (ACC) has a direct and positive relationship with the intention of using e-Gov in telecenter.

Past studies have shown that trust is an imperative variable for the adoption of e-Gov by individuals (Gupta et al., 2017). Trust (TR) is described as the perception of a citizen that an e-government platform has the necessary virtues for preserving its interest and sticking to a set of principles that it values (Venkatesh et al., 2016). However, citizens in developing countries generally have a low level of TR in their governments. Previous studies on e-Gov have frequently discussed the topic of trust (e.g., Xie et al., 2017). Rehman et al.

(2016) defined TR as a belief that the trusted group will act as expected and in a socially accountable way, thus fulfilling the expectations of the other group. Incorporating TR in the information society would give greater certainty, confidence, and consistency in network interactions (Lee et al., 2015). The principle of TR has been widely adopted in ISs research (Söllner et al., 2016). Lallmahomed et al. (2017) stated that TR has a direct and positive association with e-Gov. Furthermore, the notion of TR seems to be highly relevant in the context of telecenters.

TR has also been described throughout the literature as a factor relating to behavior through mediation (Choi & Stvilia, 2015). TR is the central mediator under the relationship marketing theory, affecting company decisions on consumer behavior (Davey & Powers, 2016). Mou et al. (2017) argued that TR "mediates" the impact of these constructs on customer choice and behavior by asserting that TR in market exchange plays an important "intermediary" role. The recent ISs literature has already identified TR characteristics in ICT-mediated communication and trades based on experience in ICT applications. As already stated by Venkatesh et al. (2016), examining TR's mediating role can provide insight into the dynamics behind the relationship between citizens' aspirations to use e-Gov, and their e-Gov actual use. A study by Alkali and Abu Mansor (2017) also verified that TR has a mediating function, whereby it mediates the association between individual variables and the intention of using e-training. Accordingly, the present study suggests the subsequent hypothesis:

***H*$_6$.** Trust (TR) mediates the association between the intention of using and the actual usage of e-Gov in telecenters.

Ajzen (2011) and Venkatesh et al. (2016) have described BI as a person's intention to follow and use a particular tool in the near future. As stated by Alalwan et al. (2016), most technology adoption work had used BI to predict IT adoption. Ajzen (2011) also stated that BI is seen as having a direct impact on adoption. Studies have shown that BI has a strong effect on the actual use of technology by people (e.g., Ajzen, 2011). In the IT adoption literature, the intention to use and the actual behavior of individual users were heavily examined. Models based on the intention that use BI to predict usage were commonly used. Past research has shown that BI significantly affects the actual actions (Al-Emran et al., 2020; Cho, 2016; Dwivedi et al., 2019; Yaseen & El Qirem, 2018). BI in the ISs literature was also found to be a strong predictor of actual system use (Devika & Mathiyalagan, 2016). Measuring BI requires both the intention to use and the actual use of e-Gov in telecenters. Thus, this study proposes the following hypothesis:

***H*$_7$.** Behavioral intent has a direct relationship with the actual usage (usage behavior) of e-Gov in telecenters.

Methods

Survey questionnaires were employed for data collection and to test the hypotheses mentioned earlier. Before the actual analysis was initiated, a pilot test was performed on 40 participants. According to Malmqvist et al. (2019), a pilot study can be defined as a *small study* to investigate the viability of a method intended for use in a test of a greater scale. A pilot study can determine the effectiveness of recruiting, randomization, retention, testing processes, experimental approaches, and innovative intervention implementation (Fraser et al., 2018; In, 2017).

We employed the probability of multi-stage cluster sampling to select telecenter users from representative areas of Malaysia. The research population included users of the telecenters at 11 selected telecenters in Peninsular Malaysia, referred to as "Pusat Internet Desa" (PIDs). Peninsular Malaysia was divided into four zones at the first stage of sampling, namely, the north, south, west, and east coast. Next, one state was randomly selected to represent each zone. Kedah was chosen in the Northern Zone, Perak in the Central Zone, Johor in the Southern Zone, and Terengganu on the East Coast. One criterion was that PIDs had been considered for making a sample frame in each of the four selected states. In the second phase, telecentre users were selected within the selected states. The sample of users of the telecentre was chosen on the basis of those users who were willing to take part in interviews on their decision whether to use the PID for e-government services. In the sample frame, only telecenter users aged 16 to 64 years were considered, based on a pilot study that users below the age of 16

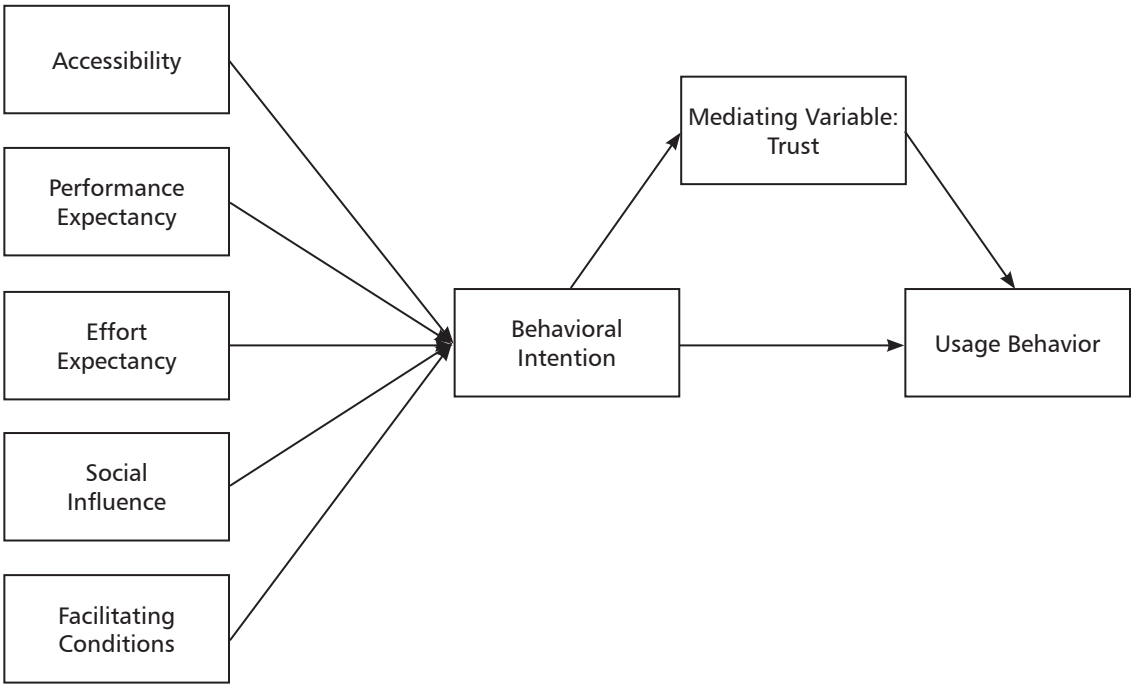

Figure 1. Research Model of the Study

experienced difficulties in responding to questions in the survey.

Soper's (2018) size calculation tool is used to determine the appropriate sample size for structural equation modeling (SEM). Based on the Soper calculation, a sample of 400 participants met the SEM requirements, as the numbers of observed and latent variables are eight and 56, respectively. Through personal visits to each of the selected PIDs, 388 usable questionnaires were collected by trained enumerators from 400 (100 respondents per state) respondents (rural users from 11 PID telecenters). The response rate was 97%.

This research applied SEM, a tool of multivariate statistical analysis used to assess the structural relationship between measured factors and latent constructs. This analysis technique is preferred by the social researcher because it integrates many standard methods such as correlation and multiple regression in a single analysis (Hair et al., 2016). Fifty-six items used for the constructs of all variables in this analysis were adapted mostly from related earlier studies (Table 1).

A Likert scale is an organized scale from which participants select one choice that best corresponds to their opinions. It is also used to assess the attitudes of the participants by asking about the degree they agree with or disagree with a specific question or argument. The advantage of a five-point Likert scale is that if a topic is highly sensitive, it may be appropriate to keep mid-point (Sekaran & Bougie, 2016). In addition, the reliability of the measures is impacted by these response options and features, and thus, a five-point Likert scale response is less homogenous (Simms et al., 2019).

The questionnaire is comprised two segments. Part one required the demographic information of telecenter users, whereas Part 2 required respondents to answer questions about their experiences using e-Gov in telecenters. Table 2 sets out the respondents' descriptive statistics.

Results

In this study, a two-step method was used to analyze the data. The first stage was to assess composite reliability (CR), average extracted variance (AVE), and confirmatory factor analysis (CFA), whereas the second step was used for structural equation modeling to test the hypotheses.

Table 1

Question Items Used for the Study

Construct	Measure
PE (Adapted from Venkatesh et al., 2003)	I can save e1nergy and time using e-Gov in the PID*.
	I am able to improve the quality of work by using e-Gov in the PID.
	The use of e-Gov in the PID is useful in my job.
	The PID is a perfect place to access e-Gov.
	The use of e-Gov systems in the PID allows activities to be carried out more rapidly.
	The PID is a place that allows access to government services without delay.
	Using e-Gov in the PID increases productivity in terms of actions.
	The PID improves performance to access government services.
EE (Adapted from Venkatesh et al., 2003)	Having the e-Gov in the PID is quick to do what I want it to do.
	The e-Gov in the PID is easy to use
	Access to government information through the PID is easy.
	It would be easy for me to use e-Gov in the PID.
	I find that e-Gov in the PID is flexible to interact with.
	Learning how to operate e-Gov in the PID would be easy for me.
	My interaction with the PID e-Gov would be clear and easy to understand.
	Learning how to use the PID to access related government information is easy.
	Using the PID would make it easier to access government services.
SI (Adapted from Venkatesh et al., 2003)	My friends and acquaintances agree I can use e-Gov systems through the PID.
	My family and relatives agree I should use the e-Gov through the PID.
	Government agencies encourage the use of e-Gov in the PID.
	People who influence my behavior think that I should use e-Gov in the PID.
	I want to use the e-Gov systems in the PID since other people use the services.
	Those who use the e-Gov facilities in the PID have more prestige.
	Once I know that people are using PID's e-Gov, I want to start using it as well.
FC (Adapted from Venkatesh et al., 2003)	I have the technical equipment needed for using the e-Gov in the PID.
	I have the skills required to use the e-Gov in PID.
	Using the PID fits well with the way I like accessing government services.
	The e-Gov system in PID is compatible with other e-Gov that I use.
	I am familiar with the e-Gov in the PID.
	I am able to use the services in the PID.

Table 1 continued...

Construct	Measure
ACC (Adapted Parkinson, 2005)	The quantity of computers in the PID is appropriate.
	The computers in the PID are free of any complications.
	Installed computers are always replaced and repaired in the PID.
	The computers in the PID are equipped with an Internet connection.
	The computers in the PID are up to date.
	The functionality of computers at the PID is satisfactory.
	The Internet facilities here are satisfactory
	Internet speed in the PID is satisfactory.
	The time allocated for Internet use in the PID is sufficient.
TR (Adapted from Papadomichelaki &	Setting up a username and password on an e- Gov website in the PID is safe.
Mentzas, 2009)	Users' privacy is well secured when using e- Gov in the PID.
	Transactions using e- Gov in the PID are safe.
	E-Gov in the PID is trustworthy.
BI (Adapted from Venkatesh et al., 2003)	In the next 3 months, I expect to use the e-Gov in the PID.
	I plan to use the PID and its facilities E-Gov.
	I will increase the usage of e-Gov inside the PID in the next 3 months.
	I have been collaborating with a local group for the next 3 months to explore ways to improve the usage of e-Gov services within the PID.
	In the next 3 months, I will get details about the e-Gov in the PID.
AU (Adapted from Venkatesh et al., 2003)	I used e- Gov service in the PID after learning about the benefits.
	Without fear, I use e- Gov service in the PID.
	From time to time, I continue to use e-Gov in the PID.
	For a variety of purposes, I have been using e-Gov in the PID for a long time.
	I strongly recommend others to use e-Gov in the PID.
	I use the PID to access e- Gov on a regular basis.
	Improved my Internet skills after learning the benefits of using the e-Gov website in the PID.
*Telecentre of Pusat Internet Desa	

Table 2

Demographic Data of Respondents

	Option	Percentage
Gender	Male	28
	Female	72
Education	Did not go to school	3
	Primary school	7
	Middle school	15
	Secondary education	49.5
	Higher education	25.5
Occupational status	Government employees	17.5
	Private sector workers	11.5
	Self-employed	32.3
	Student	15.3
	Others	23.4
Monthly income (in Ringgit)	<10,00	37.5
	1001 - 2000	36.3
	2001 – 3000	15.3
	3001 -4000	5.7
	>4001	5.2

Table 2 provides a summary of the values of Cronbach's alpha, CR, AVE, and CFA. To test the discriminatory validity, we compared the square root of the AVE and its correlation with other variables. Table 3 shows that the square root of the AVE is larger than the correlation among the variables, proposing acceptable discriminant validity, according to Henseler et al. (2015).

AMOS software version 24 was employed to examine the path, in addition to the hypotheses suggested in the structural equation modeling. Table 5 illustrates the fit indices.

As revealed in Table 4, all fit indices, excluding GFI, are within the suggested values indicated by previous studies. The significant paths are shown in Figure 2. Four of the seven hypotheses put forward in this study are found to be supported, namely, H1, H3, H4, and H7. The results demonstrate that the relationships between each of the PE, SI, and FC and the intention towards e-Gov in telecenters are significant. The results further demonstrate that behavioral intention has a significant relationship with the actual usage of e-Gov in telecenters. Nevertheless, the results show significant negative relationships between EE and accessibility and behavioral intention.

Multiple group analysis was used (Kline, 2016) to explore the mediating effect of trust. In Kline's view, the full mediation model CMIN [χ^2: 2.216. $P > 0.05$, Akaike Information Correction (AIC): 293.837] was smaller than the indirect model CMIN (χ^2: 2.758, $P > 0.05$, AIC: 349.312), and the Parsimony Normed Fit Index (PNFI) of the full mediation model (0.807) was larger than the PNFI (0.802) of the indirect model. As shown in Table 6, the beta for the direct model (.487) was reduced in the full mediation model (.330). However, the beta in the latter model was significant. Thus, there was a partial mediation effect of trust on the association between the intention of telecenter users to use e-Gov and the actual usage of these services in the context of Malaysia.

Table 3

Item Loadings on Related Factors

Factor	Item	Factor loading	AVE	CR	Cronbach's α
PE	PE2	.725	.61	.88	.936
	PE4	.745			
	PE6	.795			
	PE7	.857			
	PE8	.765			
EE	EE1	.769	.62	.94	.942
	EE2	.799			
	EE3	.833			
	EE4	.846			
	EE5	.856			
	EE7	.772			
	EE9	.688			
SI	SI1	.756	.60	.93	.937
	SI4	.766			
	SI6	.768			
	SI7	.796			
	SI8	.787			
	SI9	.823			
TR	T1	.835	.77	.930	.929
	T2	.873			
	T3	.927			
	T4	.869			
ACC	ACC 1	.560	.55	.92	.960
	ACC 3	.780			
	ACC 5	.850			
	ACC 6	.899			
	ACC 8	.786			
	ACC 9	.751			
BI	BI1	.793	.68	.95	.824
	BI2	.88			
	BI3	.799			
	BI4	.87			
	BI5	.878			
UB	UB1	.819	.69	.92	.946
	UB2	.76			
	UB3	.864			
	UB4	.848			
	UB5	.865			
	UB6	.720			
	UB7	897			
FC	FC1	.685	.59	.85	.897
	FC4	.812			
	FC5	.80			
	FC6	.761			

Notes: PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; ACC: accessibility; TR: Trust; BI: behavioral intention; UB: usage behavior.

Discussion

This study aims to add variables of technology accessibility and trust to UTAUT to examine the factors influencing e-Gov adoption among telecenter users in rural Malaysia. The findings illustrate that the intention of telecenter users to adopt e-Gov is significantly influenced by PE, SI, and FC, whereas accessibility and EE play a negative role in influencing their behavioral intention. Our findings also reveal that BI is a significant predictor of the actual usage of the e-Gov by telecenter users. In general, the proposed conceptual framework represents 58% of the variance in behavioral intention and 26% of the variance in the actual use of e-Gov in telecenters.

In terms of the factors that affect the use of e-Gov by telecenter users in rural Malaysia, this research offers evidence that PE is a significant factor affecting the preference of e-Gov users in telecenters. The users believe that well-performing e-Gov systems in telecenters would improve their overall ability to perform their jobs, improve their job performance, make them more productive, and enable them to make more profit in general. This is in line with Alraja et al.'s (2016) study, which found that PE has a positive effect on e-Gov adoption. Besides, good PE works well for rural communities by reducing stressful situations such as long-term queuing, coping with uncooperative workers, and others. Additionally, a successful e-Gov system that can be accessed through telecenters will

Table 4

Matrix of Correlation Coefficient and the Square Root of AVEs

	Mean	SD	1	2	3	4	5	6	7
1. UB	4.1	.642	**.83**						
2. BI	3.8	.816	.487	**.82**					
3. PE	3.97	.728	.554	.672	**.78**				
4. EE	3.73	.92	.622	.406	.626	**.787**			
5. SI	3.53	.893	.543	.314	.496	.648	**.77**		
6. FC	3.82	.72	.644	.733	.753	.732	.691	**.768**	
7. ACC	3.74	.714	.525	.300	.505	.530	.436	.663	**.74**
8. TR	3.749	.733	.633	.294	.426**	.602	.465	.560	.607

Notes. PE: performance expectancy; EE: effort expectancy; SI: social influence; FC: facilitating conditions; ACC: accessibility; TR: Trust; BI: behavioral intention; UB: usage behavior.

Table 5

Goodness-of-Fit Measures of the Research Model

Fit indices	Model value	Recommended value	References
χ^2/df	2.511	≤3.00	Schumacker (2017)
CFI	.909	≥0.90	Tabachnick and Fidell (2019)
GFI	.807	≥0.90	Lance et al. (2016)
IFI	.909	≥0.90	Kline (2016)
RMSEA	.062	≤0.08	Savalei (2018)

Note. CFI: Comparative fit index; GFI: Goodness-of-fit index; IFI: Incremental fit index; RMSEA: Root mean square error of approximation.

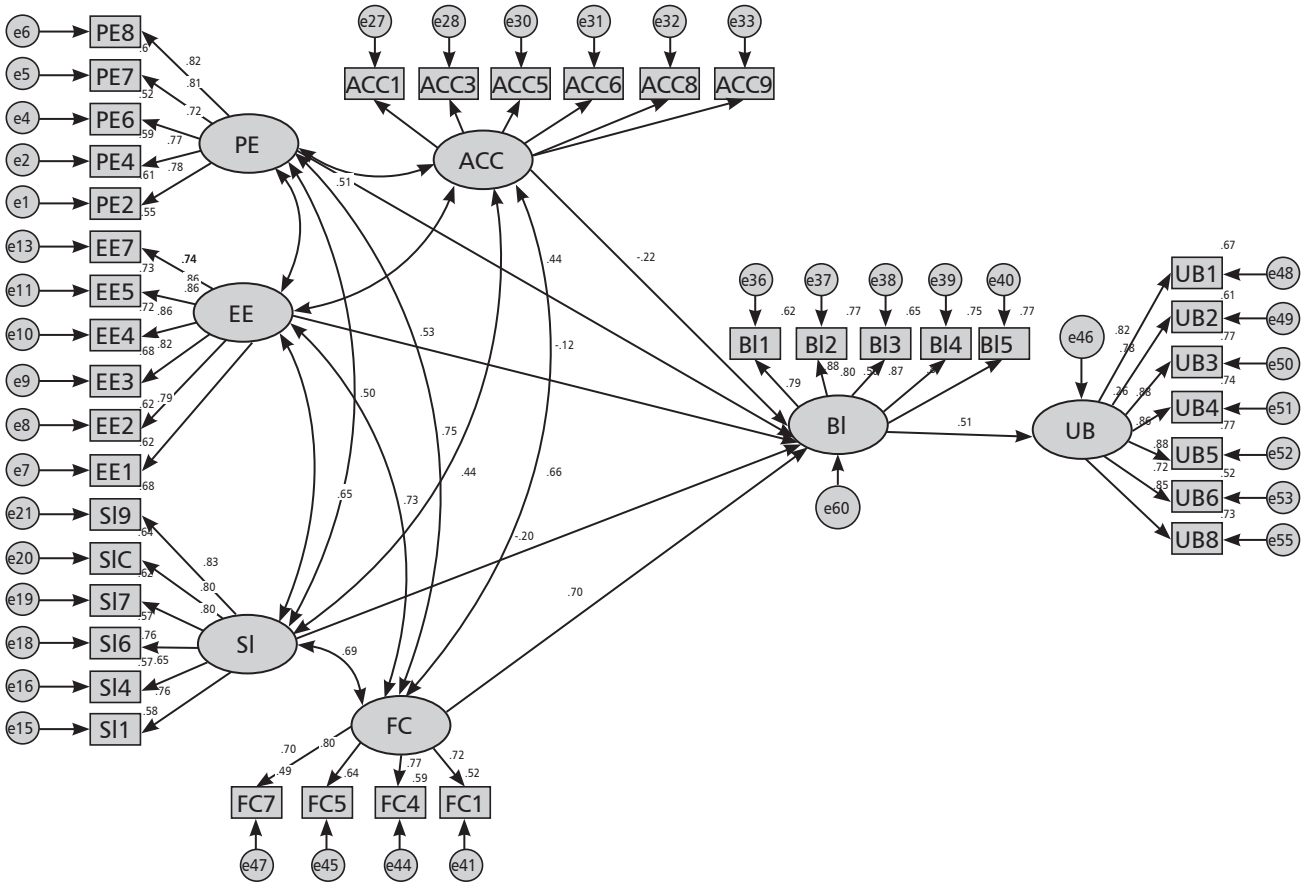

Figure 2. Research Model of the Study

Table 6

Indirect Effect Analysis of Trust

Relationship	Standardized direct effect without mediation	Standardized direct effect with mediation	Standardized indirect effect
BI-UB	.487 (P = .000)	.330 (P = .000)	.313 (P = .000)

Note. Two-tailed significance. BI: behavioral intention, UB: usage behavior.

remove the need for those living in rural areas to travel long distances to access government facilities. This time-consuming activity results in additional costs as well. However, if e-Gov in telecenters operates well in rural Malaysia, this will save both time and resources for rural communities in the country.

EE negatively affects the behavioral intention of rural Malaysian users to indulge in e-Gov via telecenters. These outcomes are inconsistent with those of earlier studies, which also show a significant association between EE and behavioral intention, indicating that the intention can be influenced by how simple it is to use a particular system (e.g., Jacob & Darmawan, 2019)2019. These earlier findings indicate that the government should make an effort to simplify systems in telecenters and to make them more convenient and able to respond in real-time to requests for e-Gov. If people in rural areas are frustrated by the

inability to easily locate information and complete transactions, their desire to make use of the e-Gov in telecenters will be weakened.

From the perspective of this study, SI is the most important determinant of the intention towards e-Gov in telecenter. Past studies have neglected to investigate the effects of SI (family and peers) in the setting up e-Gov systems in the country. These findings are inconsistent with earlier studies on the acceptance of technology (e.g., Rodrigues et al., 2016). Thus, perhaps not surprisingly, the position of SI is the most critical factor in the adoption of e-Gov among telecenter users because users can refine their perceptions and decisions based on information or stories shared by those who have already accepted and used similar IS.

We further discovered that FC directly affects the adoption of e-Gov by telecenter users. This is supported by Venkatesh et al. (2016) in their study on technology adoption. They suggested that usage is expected to rise with experience, as service users find multiple avenues for government assistance and support, thus eliminating obstacles to sustainable use. We have found that FC, such as training programs and the centralization of services through telecenters, can be instrumental in the development of positive feelings among rural communities towards the system concerned. The results also illustrate that BI has the greatest influence on actual usage. Past research has described this relationship as highly important (Ravangard et al., 2017).

Trust is another aspect of concern among the participants. In this study, trust helps telecenter users throughout rural Malaysia to do their work more quickly and puts them in contact with government authorities and services. These results show that trust in the system influences usage and somewhat mediates the association between behavioral intention and actual usage. These results are consistent with perceptions regarding the trustworthiness of telecenters, where rural communities that perceive the reliability and security of telecenters to be high will be more likely to adopt e-Gov systems. These findings also reveal the role of trust in telecenters and intermediaries that mediate the available services (Osman & Tanner, 2017), confidence in ICT-enabled networks or systems, and trust in institutions such as governments and ICT service providers (Ismail et al., 2018).

Study Implications

From a purely theoretical point of view, this study adds more knowledge on e-Gov adoption, e-Gov studies in rural areas, and specifically in telecenter studies, in the context of Malaysia. Most existing e-Gov studies focused on citizens' acceptance of e-Gov (Al-Swidi & Faaeq, 2019; Bhuasiri et al., 2016; Jung, 2019; Shuib et al., 2019); thus, the adoption of e-Gov in rural telecenter was lacking (Furuholt & Sæbø, 2018). Therefore, the current empirical study contributes to the existing body of literature, as it highlighted the suitability of using the extended UTAUT model in understanding the behavioral intention of telecenter users in relation to e-Gov in Malaysia's telecenters. It is generally understood that patterns of use of government-deployed telecenters are largely different from organizational e-Gov initiatives. This study also incorporated the UTAUT model with trust and accessibility (Talukder et al., 2020) to investigate key determinants of the use of e-Gov in telecenters. Consequently, the results indicate that the UTAUT model is not comprehensive on its own, where the trust factor was found to mediate the relationship between BI and UB in the model. Furthermore, our study uncovered a negative association between EE and BI that was not found in the original UTAUT model. The model developed in this study has created a foundation for further studies on examining the adoption of e-Gov through rural telecenters in developing nations.

The results of this study have managerial implications for the deployment of e-Gov in rural telecenters. This study determined the primary factors leading to users' decisions to adopting e-Gov systems in telecenters. The government needs to make every effort to ensure these systems are useful and beneficial for rural communities. By recognizing this main factor of use, it could highlight a new dimension to the implication of e-Gov in rural telecenters and thus contribute to reducing urban-rural inequality. In addition, the results show that telecenter operators and service providers should treat their services in telecenters accordingly. It is advisable for service providers to look into PE, SI, FC, and TR because the present study denoted the importance of such dominant factors, particularly for encouraging the usage of e-Gov in telecenters among the rural citizens in Malaysia.

Based on the findings, the government must make every effort to ensure this program is functional and

helpful for rural people. Telecenter managers must have highly skilled and trained staff to facilitate the use of e-Gov in their centers and motivate rural people's intention to use their services, especially if they are available in local languages with all the required functionalities. Many rural people in Malaysia are unable to access e-Gov because of limited resources and lack of awareness. The government should make rural people aware of e-Gov services in telecenters to boost the usage of those services. In short, it is essential to devise and execute the appropriate strategies to increase the level of trust in the usage of e-Gov systems in telecenters. Governments can reduce perceived uncertainty by making the implementation of e-Gov in telecenters smooth as possible. E-Gov should resemble traditional government services to encourage acceptance by rural people. Lastly, Malaysian telecenters should collaborate in a content generation with rural leaders, farmers, rural families, and other public and private organizations in rural locations to establish a sense of ownership and enhance the use of e-Gov in these areas for capacity building and agricultural production.

Limitations and Directions for Future Research

Some weaknesses have been identified in the present study. This study has only dealt with e-Gov via Malaysian telecenters. Future studies should look at various innovations (e.g., IoT) to boost the adoption of e-Gov in rural areas through other means, apart from the use of telecenters. Second, although this research expanded UTAUT to include two other variables (i.e., trust and accessibility), the findings of the research model's explanatory power indicate that there remain improvements to be made. Nonetheless, many other general personality variables can play a role in this context. Third, although this study is based on a quantitative study and the goals and objectives have been satisfied, using a qualitative study would have possibly strengthened our findings. Lastly, in terms of the conceptual framework, we did not theorize or address moderating effects. As previously mentioned, UTAUT/UTAUT2 could very well improve our interpretation of the phenomenon, in combination with demographic and personality variables.

Declaration of ownership:

This report is our original work.

Conflict of interest:

None.

Ethical clearance:

This study was approved by our institution.

References

Adjei-Bamfo, P., Maloreh-Nyamekye, T., & Ahenkan, A. (2019). The role of e-government in sustainable public procurement in developing countries: A systematic literature review. *Resources, Conservation and Recycling*, *142*, 189–203.

Ahmad, M. O., Markkula, J., & Oivo, M. (2016). Citizens' voice and adoption of Pakistani e-government services. In Khosrow-Pour, M., (Ed.), *International business: Concepts, methodologies, tools, and applications* (pp. 1426–1442). IGI Global.

Aji, Z. M., Yusop, N. I., Ahmad, F., Ab Aziz, A., & Jawad, Z. M. (2016). Conceptual model of technological change on telecentre effectiveness. *Computer and Information Science*, *9*(2), 10–18.

Ajzen, I. (2011). The theory of planned behavior. In P. A. M. V. Lange, A. W. Kruglanski, & E. T. Higgins (Eds.), *Handbook of theories of social psychology* (Vol. 1, pp. 438–459). Sage.

Al Mansoori, K. A., Sarabdeen, J., & Tchantchane, A. L. (2018). Investigating Emirati citizens' adoption of e-government services in Abu Dhabi using modified UTAUT model. *Information Technology & People*, *31*(2), 455–481.

Aladwani, A. M. (2018). The moderating influence of socially-inspired trust on the connection between persuasive governmental social media quality and success. *World Conference on Information Systems and Technologies*, *745*, 242–247.

Alalwan, A. A., Baabdullah, A. M., Rana, N. P., Tamilmani, K., & Dwivedi, Y. K. (2018). Examining adoption of mobile internet in Saudi Arabia: Extending TAM with perceived enjoyment, innovativeness and trust. *Technology in Society*, *55*, 100–110.

Alalwan, A. A., Dwivedi, Y. K., Rana, N. P., & Williams, M. D. (2016). Consumer adoption of mobile banking in Jordan. *Journal of Enterprise Information Management*, *29*(1), 118–139.

Alam, M. B. (2017). E-Government in India. In M. Sabharwal & E. M. Berman (Eds.), *Public administration in South Asia: India, Bangladesh, and Pakistan* (pp. 173–192). Routledge.

Al-Emran, M., Arpaci, I., & Salloum, S. A. (2020). An empirical examination of continuous intention to use m-learning: An integrated model. *Education and Information Technologies*, 1–20.

Alenezi, H., Tarhini, A., & Sharma, S. K. (2015). Development of quantitative model to investigate the strategic relationship between information quality and e-government benefits. *Transforming Government: People, Process and Policy*, *9*(3), 324–351.

Alharbi, N., Papadaki, M., & Dowland, P. (2017). The impact of security and its antecedents in behaviour intention of using e-government services. *Behaviour & Information Technology*, *36*(6), 620–636.

Al-Hujran, O., Al-Debei, M. M., Chatfield, A., & Migdadi, M. (2015). The imperative of influencing citizen attitude toward e-government adoption and use. *Computers in Human Behavior*, *53*, 189–203.

Alkali, A., & Abu Mansor, N. (2017). Interactivity and trust as antecedents of e-training use intention in Nigeria: A structural equation modelling approach. *Behavioral Sciences*, *7*(3), 1–20.

Alraja, M. N., Hammami, S., Chikhi, B., & Fekir, S. (2016). The influence of effort and performance expectancy on employees to adopt e-government: Evidence from Oman. *International Review of Management and Marketing*, *6*(4), 930–934.

Al-Swidi, A. K., & Faaeq, M. K. (2019). How robust is the UTAUT theory in explaining the usage intention of e-government services in an unstable security context?: A study in Iraq. *Electronic Government, an International Journal*, *15*(1), 37–66.

Anthopoulos, L., Reddick, C. G., Giannakidou, I., & Mavridis, N. (2016). Why e-government projects fail? An analysis of the Healthcare.gov website. *Government Information Quarterly*, *33*(1), 161–173.

Anwer, M. A., Esichaikul, V., Rehman, M., & Anjum, M. (2016). E-government services evaluation from citizen satisfaction perspective. *Transforming Government: People, Process and Policy*, *10*(1), 139–167.

Ayoung, D. A., Abbott, P., & Kashefi, A. (2016). The influence of intangible ('soft') constructs on the outcome of community ICT initiatives in Ghana: A gap archetype analysis. *The Electronic Journal of Information Systems in Developing Countries*, *77*(1), 1–22.

Bannister, F., & Connolly, R. (2015). The great theory hunt: Does e-government really have a problem? *Government Information Quarterly*, *32*(1), 1–11.

Barrett, C. B., Christiaensen, L., Sheahan, M., & Shimeles, A. (2017). *On the structural transformation of rural Africa* (World Bank Policy Research Working Paper No. 7938; pp. 11–35). World Bank.

Bhatiasevi, V. (2016). An extended UTAUT model to explain the adoption of mobile banking. *Information Development*, *32*(4), 799–814.

Bhattacherjee, A., Davis, C. J., Connolly, A. J., & Hikmet, N. (2018). User response to mandatory IT use: A coping theory perspective. *European Journal of Information Systems*, *27*(4), 395–414.

Bhuasiri, W., Zo, H., Lee, H., & Ciganek, A. P. (2016). User acceptance of e-government services: Examining an e-tax filing and payment sSystem in Thailand. *Information Technology for Development*, *22*(4), 672–695.

Brimkulov, U., & Baryktabasov, K. (2018). E-government development in the Central Asian states: Best practices, challenges and lessons learned. In L. A. Muñoz & M. P. R. Bolívar (Eds.), *International e-government development: Policy, implementation and best practice* (pp. 121–154). Palgrave Macmillan.

Cheuk, S., Atang, A., & Lo, M.-C. (2012). Community attitudes towards the telecentre in Bario, Borneo Malaysia: 14 years on. *International Journal of Innovation, Management and Technology*, *3*(6), 682–687.

Cho, J. (2016). The impact of post-adoption beliefs on the continued use of health apps. *International Journal of Medical Informatics*, *87*, 75–83.

Choi, W., & Stvilia, B. (2015). Web credibility assessment: Conceptualization, operationalization, variability, and models. *Journal of the Association for Information Science and Technology*, *66*(12), 2399–2414.

Davey, K. S., & Powers, T. L. (2016). Relationship commitment and trust in inter-organizational networks. In M. W. Obal & C. Bushardt (Eds.), *Let's get engaged! Crossing the threshold of marketing's engagement era: Proceedings of the 2014 Academy of Marketing Science (AMS) Annual Conference* (pp. 463–464). Springer.

Devika, P., & Mathiyalagan, N. (2016). Socio-demographic factors and citizens' perception of e-government. In S. Kadry & A. El Hami (Eds.), *E-Systems for the 21st century* (pp. 77–129). Apple Academic Press.

Dwivedi, Y. K., Rana, N. P., Janssen, M., Lal, B., Williams, M. D., & Clement, M. (2017). An empirical validation of a unified model of electronic government adoption (UMEGA). *Government Information Quarterly*, *34*(2), 211–230.

Dwivedi, Y. K., Rana, N. P., Jeyaraj, A., Clement, M., & Williams, M. D. (2019). Re-examining the unified theory of acceptance and use of technology (UTAUT): Towards a revised theoretical model. *Information Systems Frontiers*, *21*(3), 719–734.

Fraser, J., Fahlman, D. W., Arscott, J., & Guillot, I. (2018). Pilot testing for feasibility in a study of student retention and attrition in online undergraduate programs. *The International Review of Research in Open and Distributed Learning*, *19*(1).

Furuholt, B., & Sæbø, Ø. (2018). The role telecentres play in providing e-government services in rural areas: A

longitudinal study of Internet access and e-government services in Tanzania. *The Electronic Journal of Information Systems in Developing Countries*, *84*(1), 1–14.

Ghareeb, A. M., Darwish, N. R., & Hefney, H. A. (2019). Assessing the performance of e-government services through multi-criteria analysis: The case of Egypt. In *Machine Learning and Big Data Analytics Paradigms: Analysis, Applications and Challenges. Studies in Big Data* (pp. 547–563). Springer, Cham.

Gupta, K. P., Bhaskar, P., & Singh, S. (2017). Prioritization of factors influencing employee adoption of e-government using the analytic hierarchy process. *Journal of Systems and Information Technology*, *19*(1/2), 116–137.

Hair, J. F., Jr., Hult, G. T. M., Ringle, C., & Sarstedt, M. (2016). *A primer on partial least squares structural equation modeling (PLS-SEM)* (2nd ed.). Sage Publications.

He, W., Xu, G., Zheng, D., Zeng, Q., & Fan, W. (2016). How to strengthen the social media interactivity of e-government. *Online Information Review*, *40*(1), 79–96.

Heeks, R. (2017). *Information and communication technology for development (ICT4D)*. Routledge.

Hew, T.-S., Leong, L.-Y., Ooi, K.-B., & Chong, A. Y.-L. (2016). Predicting drivers of mobile entertainment adoption: A two-stage SEM-artificial-neural-network analysis. *Journal of Computer Information Systems*, *56*(4), 352–370.

Hung, S.-Y., Chang, C.-M., & Kuo, S.-R. (2013). User acceptance of mobile e-government services: An empirical study. *Government Information Quarterly*, *30*(1), 33–44.

In, J. (2017). Introduction of a pilot study. *Korean Journal of Anesthesiology*, *70*(6), 601– 605.

Ismail, S. A., Heeks, R., Nicholson, B., & Aman, A. (2018). Analyzing conflict and its management within ICT4D partnerships: An institutional logics perspective. *Information Technology for Development*, *24*(1), 165–187.

Jackson, S., & Wong, M. S. (2017). A cultural theory analysis of e-government: Insights from a local government council in Malaysia. *Information Systems Frontiers*, *19*(6), 1391–1405.

Jacob, D. W., & Darmawan, I. (2019). Extending the UTAUT model to understand the citizens' acceptance and use of electronic government in developing country: A structural equation modeling approach. *International Conference on Industrial Enterprise and System Engineering (ICoIESE 2018)*, 92–96.

Janowski, T. (2015). Digital government evolution: From transformation to contextualization. *Government Information Quarterly*, *32*(3), 221–236.

Janssen, M., Rana, N. P., Slade, E. L., & Dwivedi, Y. K. (2018). Trustworthiness of digital government services: Deriving a comprehensive theory through interpretive structural modelling. *Public Management Review*, *20*(5), 647–671.

Jung, D. (2019). "Assessing citizen adoption of e-government initiatives in Gambia: A validation of the technology acceptance model in information systems success". A critical article review, with questions to its publishers. *Government Information Quarterly*, *36*(1), 5–7.

Kamarudin, S., Omar, S. Z., Bolong, J., & Osman, M. N. (2018). E-Government services implementation: Is it a need? *International Journal of Academic Research in Business and Social Sciences*, *8*(11), 22–29.

Kline, R. B. (2016). *Principles and practice of structural equation modeling* (4th ed.). Guilford Press.

Kurfalı, M., Arifoğlu, A., Tokdemir, G., & Paçin, Y. (2017). Adoption of e-government services in Turkey. *Computers in Human Behavior*, *66*, 168–178.

Lallmahomed, M. Z. I., Lallmahomed, N., & Lallmahomed, G. M. (2017). Factors influencing the adoption of e-Government services in Mauritius. *Telematics and Informatics*, *34*(4), 57–72.

Lance, C. E., Beck, S. S., Fan, Y., & Carter, N. T. (2016). A taxonomy of path-related goodness-of-fit indices and recommended criterion values. *Psychological Methods*, *21*(3), 388–404.

Latchem, C. (2018). Telecentres. In *Open and distance non-formal education in edeveloping countries* (pp. 47–54). Springer.

Lee, D., Moon, J., Kim, Y. J., & Mun, Y. Y. (2015). Antecedents and consequences of mobile phone usability: Linking simplicity and interactivity to satisfaction, trust, and brand loyalty. *Information & Management*, *52*(3), 295–304.

López-López, V., Iglesias-Antelo, S., Vázquez-Sanmartín, A., Connolly, R., & Bannister, F. (2018). e-Government, transparency & reputation: An empirical study of Spanish local government. *Information Systems Management*, *35*(4), 276–293.

Macedo, I. M. (2017). Predicting the acceptance and use of information and communication technology by older adults: An empirical examination of the revised UTAUT2. *Computers in Human Behavior*, *75*, 935–948.

Malmqvist, J., Hellberg, K., Möllås, G., Rose, R., & Shevlin, M. (2019). Conducting the pilot study: A neglected part of the research process? Methodological findings supporting the importance of piloting in qualitative research studies. *International Journal of Qualitative Methods*, *18*, 1–11.

Markus, M. L., & Rowe, F. (2018). Is IT changing the world? Conceptions of causality for information systems theorizing. *MIS Quarterly*, *42*(4), 1255–1280.

Mayasari, I., Hendrowati, R., Sofia, A. I., & Wiadi, I. (2017). Implementation of e-government through

implementation of technology acceptance model. *Jurnal Aplikasi Manajemen*, *15*(4), 659–669.

Mou, J., Shin, D.-H., & Cohen, J. F. (2017). Trust and risk in consumer acceptance of e-services. *Electronic Commerce Research*, *17*(2), 255–288.

Nugroho, M. A. (2015). Impact of government support and competitor pressure on the readiness of SMEs in Indonesia in adopting the information technology. *Procedia Computer Science*, *72*, 102–111.

Osman, M. A., & Tanner, M. (2017). The influence of telecentre components on the psychological empowerment of underserved community members in the Western Cape, South Africa. *The Electronic Journal of Information Systems in Developing Countries*, *81*(1), 1–29.

Papadomichelaki, X., & Mentzas, G. (2009). A multiple-item scale for assessing e-government service quality. In M. A. Wimmer, H. J. Scholl, M. Janssen, & R. Traunmuller (Eds.), *International Conference on Electronic Government* (pp. 163–175). Springer-Verlag.

Parkinson, S. (2005). *Telecentres, Access and Development: Experience and Lessons from Uganda and South Africa*. ITDG/Fountain/IDRC.

Ramli, R. M. (2017). E-government implementation challenges in Malaysia and South Korea: A comparative study. *The Electronic Journal of Information Systems in Developing Countries*, *80*(1), 1–26.

Rana, N. P., Dwivedi, Y. K., Williams, M. D., & Weerakkody, V. (2015). Investigating success of an e-government initiative: Validation of an integrated IS success model. *Information Systems Frontiers*, *17*(1), 127–142.

Ravangard, R., Kazemi, Z., Abbasali, S. Z., Sharifian, R., & Monem, H. (2017). Development of the UTAUT2 model to measure the acceptance of medical laboratory portals by patients in Shiraz. *Electronic Physician*, *9*(2), 3862–3869.

Rehman, M., Kamal, M. M., & Esichaikul, V. (2016). Adoption of e-government services in Pakistan: A comparative study between online and offline users. *Information Systems Management*, *33*(3), 248–267.

Rodrigues, G., Sarabdeen, J., & Balasubramanian, S. (2016). Factors that influence consumer adoption of e-government services in the UAE: A UTAUT model perspective. *Journal of Internet Commerce*, *15*(1), 18–39.

Rogers, E. M. (1995). Diffusion of innovations: Modifications of a model for telecommunications. In M. W. Stoetzer & A. Mahler (Eds.), *Die diffusion von innovationen in der telekommunikation* (Vol. 17, pp. 25–38). Springer.

Saeed, S., Ramayah, T., & Mahmood, Z. (2018). *User centric e-government: Challenges and opportunities*. Springer.

Salemink, K., Strijker, D., & Bosworth, G. (2017). Rural development in the digital age: A systematic literature review on unequal ICT availability, adoption, and use in rural areas. *Journal of Rural Studies*, *54*, 360–371.

Savalei, V. (2018). On the computation of the RMSEA and CFI from the mean-and-variance corrected test statistic with nonnormal data in SEM. *Multivariate Behavioral Research*, *53*(3), 419–429.

Schumacker, R. E. (2017). *Interaction and nonlinear effects in structural equation modeling*. Routledge.

Sekaran, U., & Bougie, R. (2016). *Research methods for business: A skill building approach* (7th ed.). John Wiley & Sons.

Sharma, S. K., Al-Badi, A., Rana, N. P., & Al-Azizi, L. (2018). Mobile applications in government services (mG-App) from user's perspectives: A predictive modelling approach. *Government Information Quarterly*, *35*(4), 557–568.

Sharma, R., & Mishra, R. (2017). Investigating the role of intermediaries in adoption of public access outlets for delivery of e-Government services in developing countries: An empirical study. *Government Information Quarterly*, *34*(4), 658–679.

Shuib, L., Yadegaridehkordi, E., Ainin, S., & Feng, G. C. (2019). Malaysian urban poor adoption of e-government applications and their satisfaction. *Cogent Social Sciences*, *5*(1), 1-18.

Simms, L. J., Zelazny, K., Williams, T. F., & Bernstein, L. (2019). Does the number of response options matter? Psychometric perspectives using personality questionnaire data. *Psychological Assessment*, *31*(4), 557–566.

Sivaji, A., Rasidi, S. H., Hashim, S. H., Kuppusamy, A. D. N., Abidin, F. Z., Chuan, N. K., Musa, A., Sazali, N., Deniel, A., & Soo, S. T. (2019). *Unified theory of acceptance and use of technology of e-government services in Malaysia: Validation of survey instrument*. Ministry of International Trade and Industry.

Sohn, S. (2017). A contextual perspective on consumers' perceived usefulness: The case of mobile online shopping. *Journal of Retailing and Consumer Services*, *38*, 22–33.

Solarin, S. A., Shahbaz, M., Khan, H. N., & Razali, R. B. (2019). ICT, financial development, economic growth and electricity consumption: New evidence from Malaysia. *Global Business Review*, 1–22.

Söllner, M., Hoffmann, A., & Leimeister, J. M. (2016). Why different trust relationships matter for information systems users. *European Journal of Information Systems*, *25*(3), 274–287.

Soper, D. S. (2018). *A-priori sample size calculator for structural equation models* [Software]. http://www.danielsoper.com/statcalc

Tabachnick, B. G., & Fidell, L. S. (2019). *Using multivariate statistics* (7th ed.). Pearson.

Tabassum, G., Kulathuramaiyer, N., Harris, R., & Yeo, A. W. (2019). The indirect and intangible impacts of a telecentre on a rural community. *The Electronic Journal*

of Information Systems in Developing Countries, *85*(3), 1–15.

Tahir, Z., Malek, J. A., & Ibrahim, M. A. (2016). Developing smart ICT in rural communities in Malaysia through the establishment of telecenters. *E-Bangi*, *13*(1), 227–242.

Talukder, M. S., Sorwar, G., Bao, Y., Ahmed, J. U., & Palash, M. A. S. (2020). Predicting antecedents of wearable healthcare technology acceptance by elderly: A combined SEM-neural network approach. *Technological Forecasting and Social Change*, *150*, 1–13.

Van Oerle, S., Mahr, D., & Lievens, A. (2016). Coordinating online health communities for cognitive and affective value creation. *Journal of Service Management*, *27*(4), 481–506.

Venkatesh, V., Morris, M. G., Davis, G. B., & Davis, F. D. (2003). User acceptance of information technology: Toward a unified view. *MIS Quarterly*, *27*(3), 425–478.

Venkatesh, V., Thong, J. Y., Chan, F. K., & Hu, P. J. (2016). Managing citizens' uncertainty in e-government services: The mediating and moderating roles of transparency and trust. *Information Systems Research*, *27*(1), 87–111.

Vial, G. (2019). Understanding digital transformation: A review and a research agenda. *The Journal of Strategic Information Systems*, *28*(2), 118–144.

Henseler, J., Ringle, C. M., & Sarstedt, M. (2015). A new criterion for assessing discriminant validity in variance-based structural equation modeling. *Journal of the Academy of Marketing Science*, *43*(1), 115–135.

Wu, B., & Chen, X. (2017). Continuance intention to use MOOCs: Integrating the technology acceptance model (TAM) and task technology fit (TTF) model. *Computers in Human Behavior*, *67*, 221–232.

Xie, Q., Song, W., Peng, X., & Shabbir, M. (2017). Predictors for e-government adoption: Integrating TAM, TPB, trust and perceived risk. *The Electronic Library*, *35*(1), 2–20.

Yaseen, S. G., & El Qirem, I. A. (2018). Intention to use e-banking services in the Jordanian commercial banks. *International Journal of Bank Marketing*, *36*(3), 557–571.